Intergovernmental Oceanographic Commission
Reports of Meeting of Experts and Equivalent Bodies

Regional Forum of the Global Ocean Observing System (GOOS)

Third Session
14–17 November 2006
University of Cape Town
Cape Town, South Africa

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The Third Forum of the GOOS Regional Alliances was organised in close partnership with the African Large Marine Ecosystems projects and leadership, which greatly helped to ensure its success. IOC acknowledges their contribution and commends the excellent cooperation between GOOS-AFRICA and the African LME projects in the pursuit of their respective objectives.

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ABSTRACT

This report presents a summary of the topics discussed at the 3rd GOOS Regional Forum (14-17 November 2006, Cape Town, South Africa). Progress on the regional development of GOOS was reported through presentations from several GOOS Regional Alliances. Four sessional working groups were established to discuss and make recommendations on:

(i) potential mechanisms for a coordinated development of the Global Coastal Network of the Coastal Module of GOOS;

(ii) GOOS Regional Alliance–Large Marine Ecosystem Partnerships;

(iii) the role of GRAs in the implementation the GEO Coastal Zone Community of Practice and in the development of Integrated Systems for Multi-hazard Disaster Warning Systems; and

(iv) progress since the Second Forum and on the GRAs' Strengths, Constraints, Challenges, Priorities, Potential Solutions and Best Practice.

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1. OPENING

The Third Regional GOOS Forum took place at the University of Cape Town, South Africa, at the invitation of GOOS-AFRICA. The Chairman of GOOS-AFRICA, Professor Geoff Brundrit, opened the Forum at 08.30 on Monday 14 November 2006.

1.1 WELCOME AND INTRODUCTIONS

The Chairman of GOOS-AFRICA, on behalf of GOOS-AFRICA and its stakeholders, notably the GOOS-AFRICA Coordinating Committee and the African Large Marine Ecosystems, welcomed the participants to the University of Cape Town, South Africa. He stressed that, in hosting this Forum in Africa, GOOS-AFRICA gave evidence of its commitment and its contribution to the IOC Global Ocean Observing System. He briefly reminded the participants that the Forum was organised so as to follow up a meeting of GOOS-AFRICA and another of the African Large Marine Ecosystems, both at the same venue. He indicated that the results of these two important meetings would be considered by the present Forum. He invited the Chairman of the Intergovernmental Committee for GOOS (I-GOOS), Mr François Gérard, to address the Forum.

Mr Gérard outlined his expectations of the Third Forum. He noted that Cape Town is a place where three oceans meet, and that this Forum is the major GOOS activity in the 2006–2007 biennium. There are many challenges to be faced to ensure the effective implementation of the Global Ocean Observing System, both at the regional and the global level. This Forum was therefore crucial to the success of GOOS worldwide, since it was invited to propose a governance structure for the GRAs within the framework of IOC. Mr Gérard expected the Forum to focus on technological and scientific issues relevant to regional implementation of GOOS, but that it should also identify a governance structure that would facilitate the work of the GRAs, in consultation with I-GOOS. If the GOOS Community succeeded in developing operational systems in Africa, then this success should be replicated in other GOOS regions. He thanked the GOOS-AFRICA Coordinating Committee, the African LME project leaders and the Government of South Africa for hosting the Forum and for the provision of good facilities and a dedicated support staff.

The South African Representative to the IOC/UNESCO, Mr Ashley Johnson, formally opened the Forum on behalf of the South African Government. He welcomed the participants to Africa, to South Africa and to the University of Cape Town in the beautiful city of Cape Town, which he believed was an environment conducive to thinking. He recalled that South Africa has been making a continuing pledge in IOC and UNESCO for increased support to the developing Member States of the IOC. This was an important recommendation embodied in the Implementation Plan of the World Summit on Sustainable Development hosted by the Government of South Africa in 2002. Mr Johnson especially emphasised the fact that the Heads of African States endorsed GOOS-AFRICA as an important scientific vehicle that fast-tracks the development of operational oceanography and associated fields in Africa in support of the sustainable development of African coasts and seas. In this context, he stressed the importance of South–South, North–South and interregional cooperation among the GRAs. Noting the good attendance, he considered the Third Forum as a "mini-IOC Assembly" in Cape Town. He wished the Forum every success.

Professor George Brundrit and Mr François Gérard were nominated Co-Chairmen of the Third GOOS Forum.

1.2 ADMINISTRATIVE ARRANGEMENTS AND DOCUMENTATION

As Chairman of Plenary Session 1, Professor Brundrit invited the Technical Secretary of the Forum, the GOOS-AFRICA Coordinator and Technical Secretary, Mr Justin Ahanhanzo, to introduce the Agenda (Annex I) and the Forum documentation (Annex III). Mr Ahanhanzo welcomed the participants (Annex II) to Africa. He briefly explained some minor changes in the timetable due to the fact that some invited speakers were indisposed or would arrive later than expected. He recalled that many of the documents had been made available in advance of the Forum, through the GOOS web site (http://ioc.unesco.org/goos). To stimulate the exchange of ideas, each GRA had been asked to provide background information on its activities on a standard form (the "GRA Presentation Template"). Completed regional templates were made available prior to the Forum for most of the GRAs. However, some GRA reports were still outstanding at the time of the Forum (EuroGOOS, MedGOOS, IOCARIBE-GOOS and US-GOOS). He informed the participants that PowerPoint presentations recorded during the meeting would be distributed to each participant at the end of the Forum. The List of Participants (Annex II) was circulated for possible amendments. All the available presentations are available on the GOOS web site at: http://ioc.unesco.org/goos/grf3/GRF3_presentations.htm.

The Local Technical Coordinator of the Forum, Mr Emlyn Balarin, introduced the Local Organizing Committee, explained the local arrangements, and announced that all of the PowerPoint presentations would be made available on a CD for each participant by the close of the Forum.

2. REVIEW OF OBJECTIVES AND EXPECTED OUTPUTS OF THE FORUM

The Co-Chairman, Professor Geoff Brundrit, reviewed the objectives and expected outputs of the Third GOOS Regional Forum. Recognizing the differences among the GRAs with respect to priorities and capabilities, the overall goals of the Third Forum were to:

1. Promote the development of GRAs that contribute to and benefit from the development of GOOS by partnering with existing regional programmes with common interests
2. Initiate the establishment of a global network of GRAs that will enable regional development of coastal GOOS and oversee the establishment of the Global Coastal Network (GCN) as called for in the *Implementation Strategy for the Coastal Module of the Global Ocean Observing System* (GOOS Report No. 125).

Representatives of GRAs, LMEs and other GOOS stakeholders were invited to present their experience, achievements, constraints and challenges, and to explore funding opportunities, scientific and technological gaps. The Forum should also address the development of governance mechanisms needed to implement the Coastal Module of GOOS, including mechanisms for linking all GOOS Regional Alliances into one GOOS family regardless of the diversity of their respective needs, priorities and specificities. He outlined the objectives of the Third Forum, as follows:

1. Assess progress since the Second GOOS Regional Forum (Fiji, 2004)

2. Promote an exchange of information among the GRAs on best practices and reflect on the following key mechanisms: (i) cooperation among GRAs; (ii) establishment of strategic partnerships and synergy with other programmes relevant to GOOS; and (iii) promote North–South and South–South cooperation

3. Build on the collaboration between GOOS-AFRICA and African LMEs as a prototype, to establish mechanisms that cultivate links and synergy between the GRAs and the LMEs for mutual benefit (a major recommendation in the COOP Implementation Strategy)

4. Use the preliminary report of the joint JCOMM–GSSC–GRAs Task Team as amended by many partners as a starting point for discussion and, with due consideration of the issues raised at the Second GOOS Regional Forum (i.e. the proposal to create a GOOS Regional Council, with appropriate Terms of Reference), recommend to I-GOOS a mechanism for implementing the GOOS Coastal Network of the Coastal Module of GOOS that would meet the needs of the GRAs as a whole

5. Position GRAs as implementing bodies for the Oceans and Coasts components of Global Earth Observing System of Systems

6. Explore ways to increase funding for GRA development, including the elaboration of a blueprint on the contribution of collaboration among GRAs and LMEs to the goals of the International Waters and Biodiversity Operational Programmes of the Global Environment Facility.

Professor Brundrit emphasised the expected outputs of the Forum that should flow from the work of the Sessional Working Groups to ensure an inclusive approach. He explained the tasks of each Working Group and provided information on the logistics and facilities for them.

2.1 RESULTS FROM THE FIRST AND SECOND REGIONAL FORUMS AND SUMMARY OF PROGRESS SINCE THE SECOND FORUM

The Chairman of I-GOOS, Mr François Gérard, introduced this item. He recalled the development of GOOS from a concept to a programme with three phases: (i) the establishment of GOOS between 1991 and 2002; (ii) the developments between 2000 and 2005, including establishment of J-COMM, the initiation of the GRA Forums, the First Earth Observation Summit, the adoption of GOOS as an initial element of GEOSS, the revised Terms of Reference of I-GOOS and of the new GSSC, the adoption of the Strategy for the Implementation of the Coastal Module, and the concept of a GOOS Global Coastal Network; and (iii) the sustainability of GOOS from 2006 onwards, including the organisation of the Coastal Network (a key item on the Agenda of the Third Forum, here in Africa, as a landmark for the reinforcement of the GOOS Regional Alliances) and the preparation of the Eighth Session of I-GOOS (to be held from 13-16 June 2007).

Mr Gérard further recalled that the First Forum was organised by the stakeholders of the Global Ocean Observing System for the Mediterranean (MedGOOS) in conjunction with the 2002 annual meeting of the European Global Ocean Observing System (EuroGOOS) in Athens, Greece. A project concept for the GOOS Regional Alliance Network Development (GRAND) was initiated by the Chairperson of MedGOOS. The Second Forum was hosted by the Pacific Islands Global Ocean Observing System (PI-GOOS) in Nadi, Fiji (7–9 February 2004), where the general objectives of GOOS Regional Forums were established, as follows: (i) to bring all GRAs together regularly to reap the benefits of each other's achievements, lessons learned, challenges faced and successes; (ii) promulgate “best practices”; (iii) create a sense of community among the GRAs; and (iv) ensure an harmonious development of GOOS at the global level. A first meeting on GOOS Regional Alliance Network Development (GRAND) was held back-to-back with the Second Forum. The complete report on this project is now available (http://www.grandproject.org/) and a summary was presented at the present Forum. A proposal for a GOOS Regional Council (GRC) was also put forward at the Second Forum to coordinate

development of GRAs that contribute to and benefit from GOOS and to represent the interests of GRAs as a group to the I-GOOS and the sponsors of GOOS. However, the Seventh Session of I-GOOS (Paris, 4–7 April 2005) did not endorse the Terms of Reference of the proposed GRC. There is now a need to revise these Terms of Reference for the consideration of the I-GOOS at its Eighth Session (Paris, 13–16 June 2007)[1].

The Chairman of I-GOOS proposed a structure linking the GRAs with the I-GOOS. The key question was "What place and role for GRAs within the legal framework of GOOS and IOC?". He introduced the concept of GOOS development through Regional Ocean Observing Systems (ROOS) to be implemented through the GRAs under the guidance of I-GOOS. The web-link to Mr Gérard's presentation (including the related GRA-GOOS organisational diagram) is provided in Annex III.

2.2 OVERVIEW OF THE IMPLEMENTATION STRATEGY FOR THE COASTAL MODULE OF GOOS

The Chairman of the ad hoc JCOMM–GSSC–GRA Task Team, Professor Tom Malone, introduced this item. His presentation comprised the following parts: (i) Goals and technical challenges of implementing Coastal GOOS; (ii) Design Plan and Implementation Strategy; and (iii) Linkages to be leveraged, including the required linkages between Coastal GOOS and the Global Terrestrial Observing System (GTOS), and Coastal GOOS and the Global Earth Observing System of Systems (GEOSS).

There is a need for coordinated development of the Global and Coastal Modules of GOOS. Whereas the Global Module focuses on improving predictions (hindcasts, nowcasts, and forecasts) of climate change, marine weather and natural hazards, the coastal module focuses on the provision of data and information required to manage and mitigate impacts of climate change, natural hazards and human activities on public health and wellbeing, ecosystem health and living marine resources. Both modules also provide data and information to ensure safer and more efficient marine operations. Achieving these goals depends on the capacity to rapidly and repeatedly detect changes over a broad spectrum of time–space scales and provide timely predictions of such changes and data and information in forms and at rates needed to make more timely and effective decisions. Professor Malone asserted that "We do not have this capability to-day", and successful development of GRAs and regional ocean observing systems globally is critical for developing this capability. The many challenges to rapid detection and timely predictions include the following: (i) implementing data management and communications mechanisms that provide rapid access to diverse data from many sources; (ii) reducing the extent to which the oceans are undersampled in time, space and ecological complexity (by quantifying land-based inputs to coastal ecosystems more accurately; sustaining long-term, high-resolution time-series observations; and making more physical, chemical and biological measurements synoptically in time and space); and (iii) improving capabilities in real-time measurement of non-physical variables (in situ and remote sensing), rapid data analysis (e.g. data assimilation and coupled-modelling capabilities in support of ecosystem-based management), validation of model outputs, and skill in ecosystem prediction. The Integrated Design Plan and Implementation Strategy for the Coastal Module of GOOS can be found at:

http://unesdoc.unesco.org/images/0013/001305/130523e.pdf

http://unesdoc.unesco.org/images/0014/001412/141242e.pdf

[1] The creation of the proposed GRC and its institutional status, whether or not as a Primary Subsidiary Body of IOC (i.e. created by the IOC Assembly or Executive Council) or as a Secondary Subsidiary Body of IOC (i.e. created by I-GOOS), and the proposed Council's terms of reference, will be discussed by I-GOOS at its Eighth Session.

These reports emphasise the importance of: (i) GRAs as bodies that can engage industry, academia and government agencies in the establishment of GOOS to meet the data and information requirements of these user groups; (ii) coordinated development of regional ocean observing systems on a global scale; (iii) pilot projects as a means of building capacity and improving operational capabilities of GOOS; and (iv) implementing pilot projects through partnerships with existing regional programmes and projects that have common interests.

- Coordinated Development

A global body, such as the proposed GOOS Regional Council, is needed to: ensure timely exchange of data and information; establish priorities for capacity-building; and represent GRAs as a group to I-GOOS and other global, international bodies, as needed.

Given the importance of land-based inputs of water, sediments, nutrients, pollutants and pathogens as drivers of change in coastal ecosystems, achieving the goals and objectives of the Coastal Module of GOOS not only requires coordination with the Global Module of GOOS, but also coordination with the Coastal Module of the Global Terrestrial Observing System (GTOS). Thus, the Integrated Global Observing Strategy (IGOS) Coastal Theme recommends creation of a Joint Panel for Integrated Coastal Observations across the land–sea interface (J-PICO) to provide technical and scientific advice and guidance to the GSSC. JCOMM, the GSSC, and the GEO Coastal Zone Community of Practice have endorsed this recommendation.

- Pilot Projects

Pilot projects are recommended to: (i) improve forecasts of susceptibility to and impacts of coastal flooding on coastal populations, ecosystems and resources (lead organisations: IOC and GEO); (ii) serve blended ocean-colour products for coastal systems to facilitate detection and prediction of trends in coastal eutrophication (lead organisations: IOCCG, POGO and GEO); (iii) improve forecasts of coastal circulation through coupled deep ocean–shelf hydrodynamic models with more accurate boundary conditions involving many community modelling efforts (many groups are working on this, including EuroGOOS, MedGOOS, IOGOOS, and US-GOOS); and (iv) implement Coastal Ocean Data Assimilation Experiments (CODAE) (lead organisations: IGOS Coastal Theme and the GEO Coastal Zone Community of Practice).

- Partnerships

Of particular importance are partnerships between GRAs and Large Marine Ecosystem Programmes (LMEs), Regional Seas Conventions and other international programmes, including those of the International Council for the Exploration of the Sea (ICES) and the North Pacific Marine Science Organisation (PICES).

To facilitate the development of partnerships and implementation of a high-priority pilot project, the GEO Coastal Zone Community of Practice (CZCP) has proposed to conduct a workshop on Coastal Urbanization, Development, and Inundation. This workshop is tentatively scheduled for September 2007 with the following goals: (i) specify integrated observing system requirements of real-time responders, near-term and post-event re-builders, and longer-term planners, policy-makers, researchers and educators; and (ii) initiate a CODAE pilot project for data integration, analysis and modelling across the land–sea interface. In addition, the workshop will provide a forum for data providers and data users to interact on coastal urbanisation, development and flooding issues. The IGOS Coastal Theme Team and the GEO CZCP welcomes collaboration with GRAs in organising this workshop and in implementing the Coastal Theme. (Professor Malone's presentation can be found at http://ioc.unesco.org/goos/grf3/GRF3_presentations.htm).

2.3 THE LME CONCEPT, ITS DEVELOPMENT AND CONTRIBUTION TO GOOS

Kenneth Sherman presented this item. His presentation was based on the results of the productive GOOS-AFRICA and African LME meetings that were held in this same venue in the preceding weeks. It became clear from these meetings that the sciences should meet the needs of civil society. It is important to take into consideration what the needs of civil society are and to focus scientific thinking on these needs. More than 140 countries participate in 13 regional programmes – in the Black Sea, the Caribbean, East Africa, East Asia, the Kuwait Convention Region, the Mediterranean, the North-East Pacific, the North-West Pacific, the Red Sea and Gulf of Aden, South Asia, the South-East Pacific, the South Pacific, and West and Central Africa – all under the auspices of UNEP. There are also five partner programmes for the Antarctic, the Arctic, the Baltic Sea, the Caspian Sea and the North-East Atlantic. The countries concerned are promoting ecosystem-based assessment and management, which is a paradigm shift.

He described the ecological criteria used to determine the extent of an LME; they include: (i) bathymetry; (ii) hydrography; (iii) productivity; and (iv) trophodynamics.

He briefly described the five modules of an LME: (i) fish and fisheries; (ii) productivity; (iii) pollution and ecosystem health, with seven appropriate indicators; (iv) socio-economics focusing on civil society needs, including public goods and services; and (v) governance. He also described the tools and equipment available to measure the phytoplankton and zooplankton components; the zooplankton component is crucial. The LME approach uses suites of indicators and time-series of satellite and in situ data to assess changing ecosystem states. The quantitative indicators provide information pertinent to the objectives of GOOS and GEOSS. The African LMEs and GOOS-AFRICA show the value of cooperation and complementarity among relevant programmes in a given region. The LME/GEF projects also support the UNEP Regional Seas Programme (RSP). GEF has increased the support to the International Water Operational Strategy from $US 650 million to $US 1.8 billion, with an additional $US 200 million in support of the Sub-Sahara World Bank Fisheries grants and loans to assist countries in addressing the issue of fishery loss. This would bring the total funds available to $US 2 billion. Dr Sherman predicted that, in the next five years, there will be approximately $US 5 billion available. The GEF International Waters Operational Strategy supports the new paradigm promoting Ecosystem-based LME Restoration Actions through Transboundary Diagnostic Analysis and Strategic Action Programmes (TDA/SAP).

He considered it important for the GOOS Regional Forum to recognize the bottom-up approach based on the leadership and ownership of regional and national stakeholders. Finally, he drew attention to selected ecosystem-related WSSD Targets and Programmes of Action adopted at the WSSD in Johannesburg in August 2002. His presentation, titled "LMEs, GEOSS and GOOS: Global Integrated Monitoring and Assessments" is on the GOOS website. More information on the LMEs may be found at http://woodsmoke.edc.uri.edu/Portal/.

Ned Cyr completed the LME presentation with a discussion of the potential for collaboration between LME projects and GOOS. He recalled the five modules of the LMEs responding to specific regional conditions and priorities based on the LME observations and indicators. These indicators should be useful to the GRAs and GOOS. There are also a number of variables in common with the Coastal Module of GOOS. The extension of the PIRATA array is an excellent example of cooperation between an LME and GOOS based on the GOOS-AFRICA experience. There are LME project activities that GOOS might leverage.

Every effort must also be made to exploit new developments in the regional Large Marine Ecosystem programmes that are being funded around the world by the Global

Environmental Facility (GEF) of the World Bank, and under UNEP's reinvigorated Regional Seas Programme. As yet, few of the LME projects or the RSP projects are strong. The LMEs, RSPs and GRAs would all benefit from the development of COOP's Global Core Network and technical advice that may be provided in association with that.

2.4 PROGRESS REPORT OF THE JCOMM–GSSC–GRA TASK TEAM ON THE IMPLEMENTATION STRATEGY FOR THE COASTAL MODULE OF GOOS

The Director of EuroGOOS, Hans Dahlin, presented the report. The members of the Task Team (TT) are Geoff Brundrit (GRA), Hans Dahlin (GRA), Philippe Dandin (JCOMM & GSSC), Ed Harrison (GSSC), Johannes Guddal (JCOMM), Bob Keeley (JCOMM), Tom Malone (GSSC, Task Team Chairman) and Janice Trotte (GRA). GRA contact points were provided a draft of the report for review prior to the present Forum. This ad hoc Task Team began its work in June 2006 and will submit its final report to the JCOMM, GSSC and GRAs in February 2007.

The Team's Terms of Reference are as follows: (i) Propose a long-term coordination mechanism linking JCOMM, GSSC and GRAs to address all areas of mutual interest and avoid overlap and duplication of effort; (ii) Propose possible immediate and specific implementing actions for GSSC, JCOMM and GRAs based on COOP Implementation Plan, and in the light of existing expertise and structures; (iii) Propose longer-term implementing actions by GSSC, JCOMM and the GRAs where additional expertise and/or subsidiary mechanisms may need to be developed; (iv) Recommend what observations should be taken on by JCOMM and what should be left to the GRAs.

The Task Team's preliminary report is available at http://www.ioc-goos.org/GRF-III-8 with a view to providing an opportunity for GRAs to submit input prior to the completion of the final report. The report will be revised on the basis of comments received from this Third Forum and of reviews received to date from JCOMM, the GSSC and IOGOOS.

The main preliminary recommendations of the Task Team may be summarised as follows:

1. Coordinated development of the Global and Coastal Modules of GOOS

A linkage between I-GOOS and the proposed GOOS Regional Council should be established[2] to facilitate the establishment and adoption of comprehensive GOOS-wide policies and procedures for developing an integrated coastal–global system and to attract national commitments for coordinated implementation and sustained development of the coastal and global modules.

2. Coordinated implementation of the GCN

The proposed GOOS Regional Council should advise JCOMM on the implementation of a GCN that meets regional needs and is interoperable across local, regional and global scales. Issues of international access to and exchange of environmental data on national EEZs should be addressed initially by each GRA for its respective region.

[2] It is noted that the Task Team has not made recommendation as to how the linkage between I-GOOS and the proposed GRC should be set up in legal terms. If I-GOOS creates a GRC it would de facto make the GRC a Secondary Subsidiary Body of the IOC. If the GRC is created outside of I-GOOS and IOC it would in essence become a body with responsibilities for GOOS but outside the umbrella of I-GOOS.

The JCOMM Management Committee should work with the GOOS Regional Council (if created) to ensure that regional interests (including capacity-building) in developing the Coastal Module of GOOS are represented in each of the JCOMM Programme Areas.

3. Scientifically sound implementation of the Coastal Module of GOOS

IGOS Coastal Theme recommends the establishment of a Joint (GOOS–GTOS) Panel for Integrated Coastal Observations (across the land–sea interface) to provide technical strategic guidance for coordinated implementation of the Coastal Modules of GOOS and GTOS. Just as the Global Modules of GOOS and GCOS must coordinate the ocean-climate system across the air–sea interface, the Coastal Modules of GOOS and GTOS must address coordinated implementation across the land–sea interface. (The recommendation to establish J-PICO has been endorsed by JCOMM, the GSSC and I-GOOS. It is proposed to be jointly sponsored by FAO and IOC).

4. Role of JCOMM

JCOMM should take on all of the common variables to be measured as part of the GCN as their data streams become pre-operational and bodies are established to sustain the data streams. This should be a step-wise process based on recommendations and support from the proposed GRC. The GSSC should work with the GRAs, through the proposed GRC to establish criteria for recommendations to JCOMM that it take on the non-physical, common variables (e.g. criteria for classification as "pre-operational").

2.5 DEVELOPING SYNERGY BETWEEN LMES AND GRAS

The Chairman of GOOS-AFRICA presented the outcome and results of the preceding Pan-African meetings: the African LMEs and GOOS-AFRICA Leadership Workshop on Operational Oceanography and Remote Sensing (University of Cape Town, 6–10 November 2006). The main aim of the Workshop was to capture the vision of leading African marine scientists on the future development of operational oceanography, including satellite remote-sensing, in Africa. The Workshop was very well attended, with the participation of African marine scientists and managers from all over Africa, as well as overseas partners representing scientific and technical specialised and donor agencies. GOOS-AFRICA partners include the African Large Marine Ecosystem programmes, the Ocean Data and Information Network in Africa, the African Centre for Meteorological Applications for Development, space agencies and remote-sensing projects, including BILKO, Business and Industry Associations, notably the International Association of Oil and Gas Producers (OGP), regional economic groups, academic and research institutions and intergovernmental organisations, and bilateral partners, including France, the United Kingdom, The Netherlands and Belgium, and Flanders.

The Workshop sessions included: (i) Large marine ecosystems in Africa; (ii) Earth observation systems in Africa; (iii) Ocean remote-sensing in Africa; (iv) Ocean data and information; (v) Offshore oil and gas industries in Africa. There were also specialist sessions on: (i) Living marine resources and ecosystems health; (ii) Adaptation to climate variability; (iii) Ocean variability and predictability; (iv) Marine pollution and public health; and (v) International cooperation and support. The principal outcome was the development of the *Cooperative Framework for Operational Oceanography in Africa*.

Professor Brundrit referred to the Ministerial Declaration of the Second Forum of the African Large Marine Ecosystems. The Ministerial segment of this Second Forum was held on 13 November 2006 back to back with the GOOS-AFRICA Leadership Workshop. He recalled

that Professor Kouadio Affian, Member of GOOS-AFRICA Coordinating Committee and Vice-President of I-GOOS had stressed that the power of the cooperation between GOOS-AFRICA and the African LMEs is based on the fact that the latter have recognised the critical role of operational oceanography in ecosystem-based management. GOOS-AFRICA has the requisite expertise to empower African LMEs to meet the goal of ecosystem-based management. Other stakeholders (ODINAfrica, the oil and gas industries etc.) also have a role to play. This can be achieved only through cooperation, and it is in the best interest of Africa.

On behalf of GOOS-AFRICA and African LME stakeholders and the organisers of the preceding Pan-African meetings, Professor Brundrit said that our vision for Africa is to: (i) establish a completely integrated and fully operational African ocean observing and forecasting system; (ii) develop institutional and human capacity through implementing the system in Africa; (iii) ensure that African partnerships, both existing and new, work together in achieving our vision for Africa.

Professor Brundrit informed that the resolution is that African LMEs and GOOS-AFRICA share the same values in the implementation of: (i) the African Union vision; (ii) the relevant NEPAD Action Plans; (iii) the WSSD Implementation Plan; (iv) The Millennium Development Goals. Professor Brundrit also outlined the multi-modular Approach for Ocean Progress in Africa through the implementation of the GOOS-AFRICA's Regional Ocean Observing and Forecasting Systems (ROOFS-AFRICA), including: (i) the network of in situ observing stations in the African coastal ocean; (ii) remote-sensing of marine and coastal environments; (iii) ocean modelling and forecasting; (iv) end-to-end communications and information delivery; (v) strategic business and industry partnerships; and (vi) project management, integration and coordination. A reasonable start has been made with improving the network of in situ observations and remote-sensing of the African coastal ocean which are locally well developed. However, less progress has been made with modelling and forecasting, end-to-end delivery and industry partnerships. The next step is to consolidate in situ and remote-sensing observing systems, close gaps in the end-to-end user approach and ensure that a completely integrated observing and forecasting system is fully operational**.**

He then invited the participants to a coastal "promenade" around Africa to appreciate the progress in each of the African LMEs. The Guinea Current LME and the Benguela Current LME are at advanced stage of implementation, using combined in situ and remotely sensed data to improve the understanding of biological dynamics and physical processes in these regions. Progress is being made to fast-track the implementation of the Canary Current, the Agulhas Current, and the Somali Currents LMEs.

Responding to the question "What can the African LME projects bring to GOOS-AFRICA?", Professor Brundrit reviewed the progress and plans of African LMEs for the enhancement of African capacity. Elements of functional Regional Ocean Observing and Forecasting Systems for Africa are: (i) well established networks with representative stakeholders; (ii) regional centres of excellences able to provide products and services; (iii) training and capacity-building based on research and development; (iv) regional data centres; (v) information sharing and lessons learned; (vi) regional ocean governance mechanisms, notably the recently established BCLME and GCLME Regional Commissions.

What does GOOS-AFRICA bring to the African LMEs? GOOS-AFRICA brings: (i) international scientific and technical expertise; (ii) data collection and metadata management; (iii) training and enhancement of African capacity; (iv) instrumentation based on internationally agreed standards and quality; (v) links to international networks; (vi) access to funding; (vii)

strengthened partnerships with African LMEs and overseas partners, including the international Association of Oil and Gas Producers.

The participants welcomed the progress of GOOS-AFRICA, the outputs of the GOOS-AFRICA/LMEs Leadership Workshop on Operational Oceanography and Remote Sensing, and the results of the Second Pan-African Forum of the Large Marine Ecosystems.

The participants also agreed that the Regional Ocean Observing and Forecasting System for Africa (ROOFS-AFRICA), which is promoting a network of in situ observing stations in the African coastal ocean, remote-sensing of marine and coastal environments, ocean modelling and forecasting, end-to-end communications and information delivery, strategic business and industry partnerships, and project management, integration and coordination, could serve as a template for the other GOOS Regional Alliances. Each ROOFS-AFRICA work package is in effect generic and could be used by any other GRA, with only minor changes.

3. REPORTS BY GOOS REGIONAL ALLIANCES AND GOOS NATIONAL COMMITTEES

A representative of each GRA made a brief presentations highlighting the progress in their respective regions since the Second Forum (Fiji, 2004), and the chief issues that concerned each GRA, including impediments to progress. Links to the corresponding PowerPoint presentations are listed in Annex III.

Mrs Savi Narayanan and Mr Hans Dahlin reviewed the ongoing efforts to establish an Arctic GOOS Regional Alliance from the Canadian and European perspectives. Their presentations are listed in Annex III together with a paper by Robert Dickson on an Arctic Observation System.

Mr Adi Kellermann, the Representative of the International Council for the Exploration of the Sea (ICES), made a presentation of the observation activities within the ICES network and the progress of the ICES–IOC Steering Group on GOOS (SGGOOS). The link to this presentation is available in Annex III.

Mr Trevor Guymer gave a presentation on UK GOOS activities and drew attention to a recently published UK GOOS Prospectus. Links to the presentation and prospectus are provided in Annex III.

Mr Ray Steedman (Chairman of WAGOOS) was not able to attend the Forum, but a written report was submitted. The link to the report is provided in Annex III.

These PowerPoint presentations are also available on the GOOS website as indicated above.

The Forum welcomed the establishment of many GRAs, such as GRASP, SEAGOOS, US-GOOS and OCEATLAN, since the First Forum, in 2002. The Forum believed that the GRA community represents a healthy and fast-growing support framework for the implementation of GOOS, especially in coastal regions where important benefits might be expected to accrue to local populations from GOOS activities.

The Forum stressed the need to reinforce South–South and North–South cooperation. Initiatives, such as joint submissions of project proposals in the framework of the Africa–Caribbean–Pacific Agreement and the European Commission's Framework Programme should be encouraged. Inter-GRA cooperation should also be developed among GRAs with similar

interests and needs. In this context, the Forum welcomed the Inter-regional Alliance for Oceanography and Antarctic Research initiative jointly developed by Brazil, India and South Africa (OCEANIBSA) to foster, among other things, the development of oceanography and marine sciences and technology. OCEANIBSA held its first meeting in Angra dos Reis, Brazil, 14–16 September 2005. The initiative is coordinated at the governmental level and encompasses the development of GOOS in those regions. This is an appropriate framework to foster cooperation and joint activities among GOOS-AFRICA, OCEATLAN and IOGOOS. The Forum strongly encouraged the coordinating bodies and stakeholders of these GRAs to work together and to explore further possibilities and opportunities for joint ventures.

4. REPORTS OF THE SESSIONAL WORKING GROUPS

Four Sessional Working Groups were created to address different aspects of the Forum's concerns:

- Working Group 0, on Potential Mechanisms for a Coordinated Development of the Global Coastal Network of the Coastal Module of GOOS (chaired by Dr Mary Altalo)
- Working Group 1, on GOOS Regional Alliance–LME Partnerships (chaired by Professor John Field)
- Working Group 2, on the Role of GRAs in the Implementation the Coastal Zone Community of Practice and in the Development of Integrated Systems for Multi-hazard Disaster Warning Systems (chaired by Professor Tom Malone)
- Working Group 3, on Progress since the Second Forum and on the GRAs' Strengths, Constraints, Challenges, Priorities, Potential Solutions and Best Practice (chaired by Dr Cristelle Pratt, Professor Kouado Affian and Dr Valborg Byfield).

The Chairs of the four working groups provided introductions to start off the discussions in the break-out working groups. The Chairs of the working groups then reported the results of the working group deliberations and the Forum discussed the findings and made final recommendations. (In sections 4.1.-4.4 the introductions made by the Chairs of the working groups are followed by the final recommendations by Forum).

4.1 WORKING GROUP 0

Dr Mary Altalo introduced this item. The main objectives of this Working Group were: (i) to develop recommendations on the organisation of the GOOS Regional Alliances to implement the GCN within the GOOS institutional framework; (ii) to develop relevant recommendations to the Third Forum with a view to their submission to the ad hoc Joint JCOMM–GSSC–GRA Task Team, for its consideration; (iii) to develop recommendations to the Third Forum with a view to their submission to the next session of the I-GOOS/GSSC (Paris, 13–16 June 2007) for approval.

Dr Altalo suggested some targeted recommendations for discussion, as follows: (i) Formation of the proposed J-PICO analogous to OOPC in order to take advantage of the synergy and shared expertise between GOOS and GTOS; (ii) Combine relevant elements of the Global and Coastal Modules of GOOS within a Regional Ocean Observing System (ROOS); (iii) Define a formal structure for the possible GRC**,** including its role and responsibilities.

She also recalled the role and responsibilities of I-GOOS, National GOOS committees, IODE, GRAs and, eventually, of the proposed GRC in the implementation of the integrated Global and Coastal Modules of GOOS.

She suggested that the report of the ad hoc JCOMM–GSSC–GRA Task Team could serve as a starting point to identify the role of the GRAs, and that Working Group 0 should also focus on the following issues:

1. The establishment of the proposed J-PICO as the scientific and technical oversight body for the GCN
2. The nature of the proposed J-PICO: a technical body to provide technical and scientific advice and guidance to the GSSC, with clarification of the source of funding for the proposed J-PICO
3. The interactions between the GSSC and JCOMM
4. The possible coordinating role of the proposed GOOS Regional Council in ensuring the GRA contributions to the GCN and the Global Module of GOOS and in representing the interests of the GRAs as a group to the GSSC, I-GOOS and other global bodies as necessary and appropriate
5. Assistance to and support of I-GOOS in the development of the investment strategy for the GCN to ensure that its implementation by the GRAs is effective
6. The preparation of an up-to-date list of critical infrastructures: compare this list with inventory, identification of gaps and preparation of an investment strategy to fill gaps in order to bring the GRAs to a minimum necessary level of capability.

The Forum agreed that the GRAs play a key role in the implementation of the systems.

The report of Working Group 0 is available at: http://www.ioc-goos.org/GRF3-WG-report-1.

The Third GOOS Regional Forum**,** having considered the report of Working Group 0**,** thanked Mary Altalo for chairing the Working Group 0. It also acknowledged the work of the ad hoc Joint JCOMM–GSSC–GRA Task Team chaired by Tom Malone.

The Forum thoroughly discussed the Report produced by the JCOMM–GSSC–GRA Task Team and drew up several recommended actions.

To enable the implementation of the Global Coastal Network, it is critically important that:

1. The revised organisational structure presented in the figure here below be accepted
2. The proposed J-PICO be created as an advisory body under GSSC for the purpose of coordinating the GOOS and GTOS efforts in coastal systems
3. The terms of reference for the proposed J-PICO, as presented by the ad hoc Joint JCOMM–GSSC–GRA Task Team, be accepted
4. The proposed GRC be created to represent the interests of GRAs to I-GOOS, the GSSC, and other global bodies, as appropriate and necessary, and to coordinate GRAs' contributions to the implementation of the GCN and the Global Module of GOOS.

To achieve the coordinated development of the operational capabilities to meet those GOOS objectives that require non-physical data, the following actions need to be taken:

1. The GSSC should work with the GRAs through the proposed GOOS Regional Council to establish criteria for recommending the non-physical variables that it would include in the JCOMM list of "pre-operational" assets. In that regard, GRAs should specify observational requirements in their respective regions and ensure that the methods and standards developed and maintained by JCOMM are used

2. The JCOMM should provide a framework within which, services are delivered and the implementation of the operational elements would be coordinated through commitments from national representatives. This process needs to be explicitly defined and well coordinated within each GRA
3. JCOMM "liaisons" should be identified and nominated within each GRA
4. An annual process for GRAs to present candidate programmes through the proposed GRC to the GSSC should be identified, for transition to operations
5. The process for developing new, and approving existing, standards, protocols, requirements, etc. should be identified.

With regard to GRAs' organisational structure, it was further recognized that:

1. The concept of Regional Ocean Observing Systems (ROOS) should be adopted, so as to convey the understanding that both the Coastal and the Global Modules of GOOS are being implemented in each region
2. The concept of implementation for the Global Coastal Network (GCN) element of the coastal system should be coordinated with the global as well as the land-based systems
3. One "end-to-end" demonstration/pilot project should be proposed per region, complying with GOOS principles.

Bearing in mind the importance of implementing all the actions mentioned above, the Third GOOS Regional Forum proposed the following recommendations to I-GOOS:

1. The existing GRAs should be formally recognized at the next session, on the basis of GOOS principles and related recommendations from the Third Forum
2. All GRAs thus recognized should nominate a representative to serve on the proposed GOOS Regional Council (GRC)
3. The GRC (if created) should elect a Chairperson to serve as an ex-officio member of the I-GOOS Board
4. The terms of reference for the proposed GRC should be developed based on recommendations from the Third Forum
5. The GRAs, via the proposed GRC, and in consultation with the GSSC, should identify their priorities for ROOS implementation. The proposed GRC should then prepare the package of projects for presentation to the GSSC for endorsement
6. I-GOOS should provide guidelines for the elaboration of GRA specific performance metrics to be jointly developed by the GRAs and the GSSC, so as to ascertain the capability of each GRA, guide the development of the ROOS towards maturity, and document progress in the achievement of regional goals.

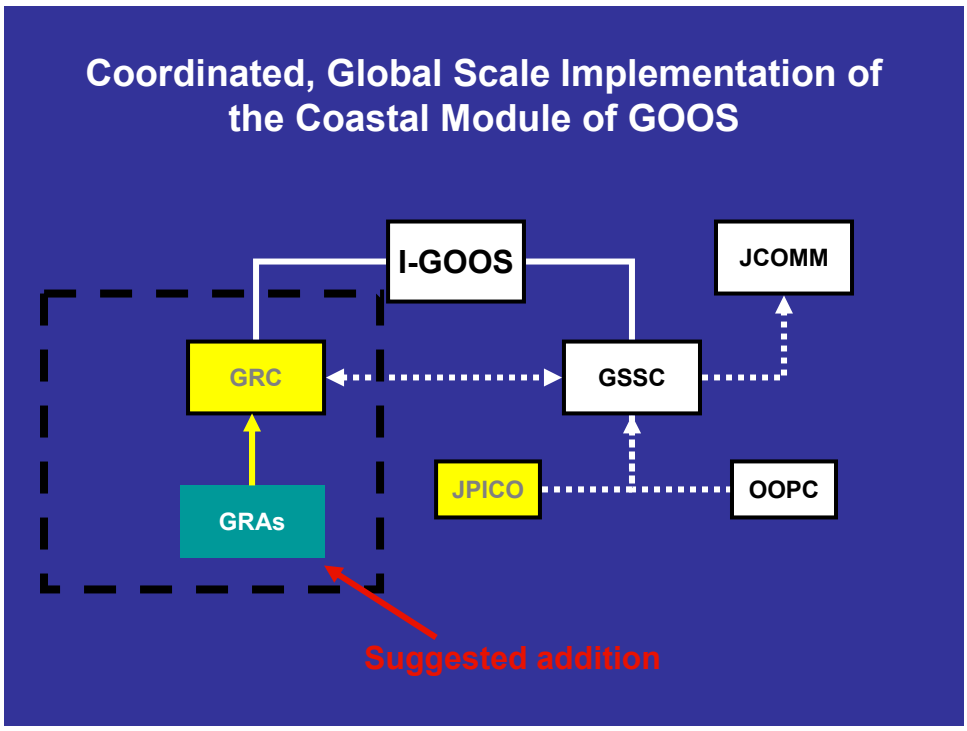

Figure 1. Proposed revised organisational structure of the governance of GOOS.

4.2 WORKING GROUP 1

The Chairman of GSSC, Professor John Field, introduced the objective of this Sessional Working Group: the development of GRA–LME Partnerships.

The LME Programmes provide a mechanism for establishing coastal GOOS in developing countries based on the recognition that: (i) the LME Programmes and GOOS have similar societal goals; (ii) many objectives of the LME Programmes are similar to those of coastal GOOS; (iii) there is a need for similar regional collaboration; and (iv) neighbouring countries usually have similar needs.

The objectives of WG1 were therefore to: (i) recommend procedures for enabling synergy between LME Programmes and GRAs; (ii) identify the probable benefits of GRA–LME partnerships; (iii) identify high- priority pilot projects that will enable GRA–LME synergy.

Based on this, Professor Field stressed that the key areas for partnership between the GRAs and the LMEs for mutual benefit reside in the implementation of high-priority pilot projects involving multinational partnerships between developed and developing countries. He mentioned four COOP Priority Pilot Projects.

1. The Coastal Inundation Project aims at developing a multi-hazard warning system that will help to improve the skill of data-assimilating models as decision support tools.

2. The Project on Blended Ocean-Colour Products for Coastal Systems involves various partners, including the Partnership for Observation of the Global Ocean (POGO) and the International Ocean-Colour Coordinating Group (IOCCG). This Project is aimed at establishing regional laboratory networks with a view to providing data for calibrating and validating algorithms used to calculate sea-surface chlorophyll [Chl] from satellite

remote-sensing of ocean colour and to making comparative analyses of variation in the chlorophyll fields in coastal ecosystems, globally; regional processing centres play a key role in this endeavour. Potential regional networks and processing centres include the following: (i) North Atlantic; (ii) Antares in the Caribbean and Latin America; (iii) China and South-East Asia; (iv) Benguela Current region in Africa; and (v) Indian Ocean.

3. The Project on Coupling Deep Ocean–Shelf Hydrodynamic Models

4. The Coastal Ocean Data Assimilation Experiments (CODAE**).**

The report of the working group is available at: http://www.ioc-goos.org/GRF3-WG-report-2.

The Third GOOS Regional Forum, having considered the report of Working Group 0, thanked John Field for chairing the Working Group 1.

The Forum, having considered the report of Working Group 1, welcomed the synergy so far developed between the Large Marine Ecosystems programmes and GOOS in some regions, and in particular the success in the co-operation between GOOS-AFRICA and the African LMEs. It expressed its appreciation to the GEF for its support to the African LME programmes.

The LME projects bring sustained biological, physical and chemical observations, for the assessment of the changing states of ecosystem health, fisheries management, habitat restoration and pollution control, into a socio-economic and governance framework, whereas GOOS brings a global climate-change perspective and a global network for data exchange and analysis, co-ordination and capacity development.

The benefits to GOOS from LME–GRA partnerships are:

1. The LMEs bring ministerial agreements on data sharing and analysis, and joint surveys, including the five LME programme modules: (i) Fish and fisheries; (ii) Coastal pollution and ecosystem health; (iii) Productivity; (iv) Socio-economics; (v) Governance and management

2. GOOS can draw on data and information collected by the LME projects (e.g. GCLME).

3. The LME projects can provide their GRA partners with biological information to help them meet their ecological objectives.

The benefits to the LME projects from LME–GRA partnerships are:

1. Global data exchange under IODE (e.g. ODINAFRICA and GOOS-AFRICA, ODINCARSA and GRASP)

2. Capacity-building and training under IOC (e.g. Ocean Teacher, Bilko)

3. Inputs to the development of multi-hazard early warning systems and global climate-change assessment under GOOS

4. GOOS identifies customers and provides a mechanism to serve users

5. GOOS provides political leverage for long-term sustainability, particularly through its role as the marine component of the GEO System of Systems.

The Third GOOS Regional Forum recommended that GOOS implement the following Pilot Projects:

1. Ocean Chlorophyll Global Integrated Network (ChloroGIN). This proposed project would be a global extension of the Latin-American Antares network to Africa, India and SE Asia; it is being developed by GOOS in conjunction with GEO, IOCCG and POGO. It includes satellite remote-sensing of ocean colour and sea-surface-temperature, and in situ observations of surface and subsurface chlorophyll and other variables, with a view to producing a large-scale time-series of ocean chlorophyll and productivity data as a basis for indicators of the state of each large marine ecosystem. The project would make available near-real-time maps of ocean colour on the linked project websites. Subsurface chlorophyll should be measured in each region using undulators and other modern technology, to complement the satellite sea-surface observations.

Action should be taken by: GSSC, GRAs (OCEATLAN, GRASP, IOGOOS, GOOS-AFRICA and SEAGOOS), seeking the cooperation and support of POGO, IOCCG and GEO.

2. Land-based Sources of Marine Pollution and Run-off. This proposed project would involve monitoring the amount of water and other material discharged or dumped into coastal seas and the content of the water, sediments, pollutants, sewage, waste, etc. This would require frequent measurements and should be implemented in several regions coordinated by the corresponding GRAs. For the implementation, the GPO should link with the UNEP Global Programme of Action on Land-based Sources of Marine Pollution, as well as GEWEX and LOICZ.

The proposed J-PICO should make recommendations on how to extend operational projects in some regions to other GRAs, as a matter of priority.

Action should be taken by: GPO, J-PICO, seeking the cooperation and support of UNEP, GEWEX and LOICZ.

3. Wind-wave–Current Interaction. This proposed project would involve operational forecasting for coastal areas. The activities envisaged under this project are already operational in some regions as a service to the offshore oil and gas industry whose Association (OGP) has requested its expansion into a GOOS pilot study in which the industry could participate. The Project should establish links with GODAE and JCOMM.

Action should be taken by: GPO and GSSC.

The Third Forum also made some other recommendations relating to the output of Working Group 1:

1. Given the fact that the Benguela Current LME and GOOS-AFRICA have been collaborating to achieve their complementary objectives, and that this co-operation represents the most advanced partnership to date between an LME project and a GRA, the Third Forum recommended that the partnership conduct a “lessons learned” analysis of its experience in the light of the five LME modules mentioned here above and produce a report that could be used by LME–GRA partnerships in other regions.

Action should be taken by: GOOS-AFRICA jointly with BCLME,

2. Proof of concept studies are needed to facilitate downscaling 3-D dynamic models from the open ocean to the coastal ocean and for coastal ocean data-assimilation experiments. The results of such studies carried out in some countries should be made available to those GRAs still

developing such activities. A meeting of those groups that are engaged in such downscaling studies should be called with a view to enhancing the relevant cooperation among GRAs.

Action should be taken by: GSSC, GODAE.

3. Regional Ocean Observing Systems (ROOS) should be encouraged to form partnerships with the appropriate Large Marine Ecosystem programmes, where their areas of concern overlap.

Action should be taken by: All GRAs/ROOS with LME projects that overlap geographically.

The recommendations of future GOOS Regional Forums should be so formulated as to ensure complementarity among LME programmes and GOOS Regional Alliances, since the LME programmes are getting funding for observing and assessment systems coupled to management which are of benefit to GOOS.

Action should be taken by: GRAs with the corresponding LMEs.

4. Collaboration between the Chairperson of I-GOOS and the Director of GEF. The Chairperson of I-GOOS should write a letter to the Director of GEF, indicating the invaluable role that the LME projects are already playing, and still need to play, in developing the end-to-end ecological observing, analysis and management systems that are needed to help meet the GOOS ecological objectives.

Action should be taken by: I-GOOS Chairperson.

4.3 WORKING GROUP 2

Tom Malone, Chairman of WG2, introduced this item.

The suggested focus for Working Group 2 was on the potential role of GRAs in (i) Implementing the Group on Earth Observations (GEO) Coastal Zone Community of Practice (CZCP); and (ii) Developing a multi-hazard integrated system for mitigating the impacts of tropical cyclones, extra tropical storms and tsunamis. GEO has been establishing Communities of Practice to (i) engage data providers and users in the specification of observing system requirements; (ii) assess observing system capabilities in terms of these requirements; (iii) establish a framework to integrate remote and in situ observations across the land-sea interface; and (iv) to stimulate collaboration among institutions with common interests to achieve GEO benefits. The CZCP was approved by the GEO User Interface committee to address two priority foci: (i) coastal populations at risk from natural hazards and impacts of coastal development; and (ii) coastal ecosystem health, productivity and the earth's hydrological and biogeochemical cycles. Tom Malone suggested discussing two possible ways for leveraging support for GRAs through the CZCP: (i) recognizing GRAs as Commuities of Practice by GEO; and (ii) by collaboration to launch a pilot project that enables capacity building and contributes to the implementation of ROOSs and the GCN.

The Representative of WMO, Mr Edgard Cabrera, provided information which served as a background for the possible role of GRAs in the development of integrated systems for multi-hazard disaster warning systems. Mr Cabrera stressed the fact that nations cannot avoid natural hazards, but ought to prevent them from becoming major disasters. The WMO global data processing and forecasting centres are providing technical support for analysis and forecasting of natural hazards and that the GTS has been used as a backbone telecommunication system for the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) coordinated by IOC. WMO is

promoting regional co-operation in disaster preparedness through such projects as: (i) WMO Global Tropical Cyclone and EWS; (ii) Cyclone Preparedness Programme in Bangladesh; (iii) Cyclone Early Warning in Cuba; (iv) The "Vigilance" Strategy, in France; and (v) Shangai Multi-Hazard Early Warning and Emergency Response Programme.

The Forum stressed that the development and implementation of marine multi-hazard warning systems had a very high profile at the present time, and that a lot of work was already underway, in particular that being coordinated by IOC and WMO. It was therefore important not to initiate any new activities, but rather to consider ways in which the GRAs might contribute to and support these existing activities. The Forum urged that discussions focus on this particular aspect. It was also stressed that the instruments and communications protocols available to GRAs should be used to promote the implementation of a single observing system. Most countries would not run more than one observing system for multiple purposes.

The report of the working group is available at: http://www.ioc-goos.org/GRF3-WG-report-3.

The Working Group report focussed on the potential roles of GRAs in: (i) implementing the GEO Coastal Zone Community of Practice; (ii) developing an integrated multi-hazard warning system for mitigating the impacts of tropical cyclones, extra-tropical storms and tsunamis; and (iii) the organisation of a CZCP Workshop on Coastal Urbanization, Development and Inundation, tentatively scheduled for September 2007.

1. The role of GRAs in implementing GEO Coastal Zone Community of Practice

The GEO User Interface Committee (UIC) was established to engage users in the development and implementation of a sustained GEOSS that would provide the data and information required under the nine societal benefit areas specified by user groups at the national, regional and global levels. The UIC is doing this through the establishment of Communities of Practice (CPs) that are expected to: (i) engage data providers and users in the specification of observing system requirements; (ii) assess observing system capabilities in terms of these requirements; (iii) establish a framework to integrate remote and in situ observations across the land–sea interface; and (iv) stimulate collaboration among institutions with common interests, to achieve GEO benefits.

A Coastal Zone Community of Practice (CZCP) was approved by the GEO User Interface Committee in December 2005. The CZCP is developing a strategy for engaging user groups (decision-makers from the private and the public sectors) across the land–sea interface that depend on, use, manage or study coastal systems in the specification of their data and information requirements. Two related user focus areas are to be addressed: (i) Coastal populations at risk from natural hazards and from the impacts of coastal development; and (ii) Coastal ecosystem health, productivity and Earth's hydrological and biogeochemical cycles.

Given that the functions of GRAs and CPs are similar and that the CZCP is addressing high-level goals of GOOS, the Forum requested the IOC to seek GEO endorsement of GRAs as GEO Communities of Practice for oceans and coasts. The Forum asked that the following message be conveyed by the Executive Secretary of the IOC to the 3rd GEO Plenary.

Given: (i) that the GEO has recognized GOOS as the oceans and coasts component of GEOSS; (ii) the importance of achieving the goals of GOOS to realize the benefits of GEOSS; (iii) that GRAs already perform functions expected of GEO Community of Practice; and (iv) that

the GEOSS is to be built on relevant existing programmes, The Third GOOS Regional Forum, noting that GOOS is sponsored by the IOC, WMO, UNEP, and ICSU, recommended that the IOC representative at the next GEO meeting, in November 2006, request the GEO to recognize the importance of GOOS Regional Alliances to the realization of the societal benefits of the GEOSS through the activities of the Coastal Zone Community of Practice.

2. Role of GRAs in developing an integrated multi-hazard warning system for mitigating the impacts of tropical cyclones, extra-tropical storms and tsunamis

GRAs provide data and information that may be used by responsible operational bodies to issue warnings and forecasts. GRAs clearly have a role in supporting multi-hazard warning systems in the following areas:

- Coordination, integration and efficient use of available resources
- Deployment, maintenance, calibration, development of standards, data management, reporting, communication networks, education, publication
- Promotion of the transfer of research and development outputs, technology, and simulation applications among developed and developing or smaller GRAs
- Coordination role in identifying who is involved in hazard detection and response, in making meteorological observations, and in effectively facilitating collaboration and exchange
- Education, which is essential to the reliability and success of the information reaching affected communities.

3. Whether GRAs should participate in the organisation of a CZCP Workshop on Coastal Urbanization, Development and Inundation, tentatively scheduled for September 2007

The tentative goals and objectives of this Workshop are to specify data and information requirements of three user groups: (i) real-time responders; (ii) near-term, post-event re-builders; and (iii) longer-term planners, policy-makers, researchers and educators. The Workshop is expected to focus on observing system requirements for: (i) assessing changes in community susceptibility and resilience to coastal flooding in high-risk regions; (ii) assessing and forecasting impacts on coastal populations, ecosystems and the living resources they support; and (iii) initiating planning for Coastal Ocean Data Assimilation Experiment pilot projects on data integration, analysis and modelling across the land–sea interface in two or more high-risk regions.

The Third GOOS Regional Forum recommended that GRAs consider getting involved in this activity by: (i) nominating each a representative to serve on the Workshop Organizing Committee, with a view to refining the goals and defining the deliverables of the Workshop, helping set the agenda and identifying who should be invited to participate in the Workshop; and/or (ii) becoming a sponsor; and/or (iii) serving as a host; and/or (iii) providing the venue. The Forum also encouraged GRAs to contact the CZCP through Tom Malone if they are interested in participating in some way.

4.4 WORKING GROUP 3

Dr Christelle Pratt, Co-Chair of Working Group 3, provided an introduction to start off the discussions in this working group. She suggested the group to focus on (i) issues pertaining to the strengths, constraints, challenges and priorities of GRAs; (ii) potential solutions and best practices; (iii) potential sources for resources; (iv) actions to be taken before the 4th GOOS Regional Forum in 2008.

The report of the working group is available at: http://www.ioc-goos.org/GRF3-WG-report-4.

The Forum, after having considered the Report of Sessional Working Group 3, reached the following Conclusions and Recommendations for action.

The sustainability of GRAs and ROOS.

There is a need for a strategy for the development of the ROOS through the GRAs. The GRAs should each identify up to four key regional priorities, the products to be developed to address these priorities, and the societal benefits of these products, along the following lines: (i) Core parameters, equipment, data, and products; (ii) Partnership between data providers and information services; (iii) Communication of societal benefits using example products; (iv) Targeted capacity-building at several levels (data, products, information delivery, communication to end users).

Communication and education strategy

There is a need to communicate: (i) The societal benefits of GRAs activities at all levels; (ii) In simple terms, the necessity of ROOS for sustainable development (social, economic, environmental); (iii) How the ROOS provide essential information for informed decision-making.

There is a need to educate at several levels: (i) End users of products and services; (ii) Policy-makers; (iii) General public; (iv) Schools (future leaders and scientists). There is also a need to look for educational initiatives that could leverage extra UNESCO support, and education using GOOS may increase national support for IOC. Possible avenues of search are:

- Partnership with professional communicators
- Media: press officers/communicators in Member State institutions
- Social marketers
- Teachers and educators
- WMO communication activities.

Communication among GRAs

The GRAs need to: (i) assume a commitment to attend and actively participate in the biennial GOOS Regional Forums; (ii) maintain a dialogue intersessionally through thematic working group(s) with a nominated moderator who has responsibility for facilitating a virtual (electronic) discussion and producing an outcome to be presented at the next regional forum, or through an electronic forum for practical exchange of best practice.

Partnerships and collaboration

There is a need for partnerships to sustain GRA activities to: (i) ensure programme delivery; (ii) avoid duplication of effort; (iii) share best practice; (iv) ensure dialogue with users of products and services; (v) leverage funding.

Regarding inter-GRA partnerships, there is a need for: (i) Twinning or mentoring arrangements between GRAs; (ii) Ministerial-level collaboration agreements between the Member States in different GRAs, with a view to facilitating formal inter-GRA collaboration (an example is the South Africa–Brazil–India Agreement, OCEANIBSA); (iii) Informal networking among GRAs.

GRAs should also reach out to other relevant intergovernmental bodies for better coordination and cooperation, notably WMO, UNEP and ISDR, and within IOC, with IODE/ODINs.

Capacity-building, resources

The development of human resources should be considered under three headings: (i) Training at different levels (formal, professional); (ii) Retention of trained staff; (iii) Exchange.

The development and transfer of relevant technology should be pursued.

The improvement of data delivery and exchange should be considered under three headings: (i) Bandwidth issues, but will time solve this? (ii) the sharing of solutions in some regions (e.g. BCLME/UCT) with other bodies: (iii) working with IODE and the ODINs .

The exploitation of available ships, ship time and platforms of opportunity should be increased, bearing in mind: (i) the fact that some regions have well developed ships-of-opportunity programmes; (ii) that experience and technology may be shared and be extended globally; (iii) the benefits from working with existing global initiatives; (iv) the availability of the WMO suite of Met-ocean data from ships of opportunity.

Funding

Funding may be increased through several environmental initiatives that may leverage support for GRA activities. It is therefore necessary to identify: (i) global, regional and national initiatives that may provide support (donors, partner organisations); (ii) key objectives of different funding initiatives and determine how GOOS objectives are aligned with these.

Examples are: (i) The European Commission's European Development Fund and Thematic Programme, Framework Programme 7 (North–South cooperation); (ii) The European Commission's ACP Observatory for Sustainable Development (it is therefore urgent to contact the regional programming officers who will be negotiating priorities with the EC in early-2007; Euro-GOOS could assist at the national level); (iii) the World Heritage Centre, which is interested in observations in support of the creation of new or the strengthening of existing marine protected areas; (iv) National development partners.

Actions

The Forum recommended the following specific actions:

1. Completion of an inventory of other global, regional or national initiatives and programmes that would allow GRAs to leverage resources and avoid duplication (LME, IWRM, HYCOS, UNEP Regional Seas Programme).
   Action should be taken by: GRAs
   Mechanism: Electronic forum
   Timeline: Before I-GOOS-VIII

2. The setting-up of a regional discussion forum to maintain a dialogue intersessionally, starting with key points in the GOOS Implementation Plan.
   Action should be taken by: GRAs/moderator(s) to be identified (GPO to remind the GRAs)
   Mechanism: Electronic forum
   Timeline: Ongoing with biennial reports

3. Completion of an inventory of national, regional and international development partners, and the determination of how GOOS priorities align with their development objectives.

Action should be taken by: GRA Chairpersons (GPO to remind the GRAs)
Mechanism: Electronic forum on the GOOS website for sharing best practice in funding applications
Timeline: By I-GOOS-VIII and ongoing

4. Working across GRAs to develop products that increase GOOS visibility, to enable GRAs to achieve sustained national and regional support (for example, the GRASP ocean analysis bulletin for the SE Pacific Region).

Action should be taken by: GRAs (GPO to remind the GRAs)
Mechanism: Identify at least one key demonstration product
Timeline: By the Fourth GOOS Regional Forum (2008)

5. The development of a sustained and funded GRA communication and education strategy that builds on existing IOC initiatives (for example, the IODE/Ocean Teacher, UNESCO/Bilko, Ocean Portal, and SEREAD).

Action should be taken by: Chairperson of the Third GOOS Regional Forum, to request resources from the GPO
Mechanism: Further development of existing education and communication initiatives
Timeline: By the Fourth GOOS Regional Forum (and ongoing).

5. RECOMMENDATIONS/ACTIONS

The Third GOOS Regional Forum recommended adoption of the organisation of the GOOS Regional Alliances to implement the GCN within the GOOS institutional framework, proposed by the Sessional Working Group 0; it also adopted the following Recommendations.

The Forum, having considered thoroughly the Report of the ad hoc JCOMM–GSSC–GRA Task Team on the Implementation Strategy for the Coastal Module of GOOS made the following recommended actions:

To enable the implementation of the Global Coastal Network

1. The revised organisational structure presented in the figure in section 4.1 here above be adopted
2. The proposed J-PICO be created as an advisory body under GSSC for the purpose of coordinating the GOOS and GTOS efforts in coastal systems
3. The terms of reference for the proposed J-PICO, as presented by the Task Team, be accepted
4. The proposed GRC be created to represent the interests of GRAs to I-GOOS, the GSSC, and other global bodies, as appropriate and necessary, and to coordinate GRAs' contributions to the implementation of the Global Coastal Network (GCN) and the Global Module of GOOS.

To achieve the coordinated development of the operational capabilities to meet those GOOS objectives requiring non-physical data

1. The GSSC should work with the GRAs through the proposed GOOS Regional Council to establish criteria for recommending the non-physical variables that it would include in the JCOMM list of "pre-operational" assets. In that regard, GRAs should specify observational requirements in their respective regions and ensure that the methods and standards developed and maintained by JCOMM are used

2. The JCOMM should provide a framework within which, services are delivered and the operational elements implemented would be coordinated through commitments from national representatives; this process needs to be explicitly defined and well coordinated within each GRA
3. JCOMM "liaisons" should be identified and nominated within each GRA
4. An annual process for GRAs to present candidate programmes through the proposed GRC to the GSSC should be identified, for transition to operations
5. The process for developing new, and approving existing, standards, protocols, requirements, etc. should be identified.

Regarding the GRAs' organisational structure

1. The concept of Regional Ocean Observing Systems (ROOS) should be adopted, so as to convey the understanding that both the Coastal and the Global Modules of GOOS are being implemented in each region
2. The implementation for the Global Coastal Network (GCN) element of the coastal system should be coordinated with the global as well as the land-based systems
3. One "end-to-end" demonstration/pilot project should be proposed per region, complying with GOOS principles.

Action by the I-GOOS

1. The existing GRAs should be formally recognized by I-GOOS, in light of GOOS principles, the GOOS Regional Policy and related recommendations from the Third Forum
2. All GRAs thus recognized should nominate a representative to serve on the proposed GOOS Regional Council (GRC)
3. The GRC (if created) should elect a Chairperson to serve as an ex-officio member of the I-GOOS Board
4. The terms of reference for the proposed GRC should be developed in light of recommendations from the Third Forum
5. The GRAs, via the proposed GRC, and in consultation with the GSSC, should identify their priorities for ROOS implementation; the proposed GRC should then prepare the package of projects for presentation to the GSSC for endorsement
6. The Board should provide guidelines for the elaboration of GRA specific performance metrics to be jointly developed by the GRAs and the GSSC, so as to ascertain the capability of each GRA, guide the development of the ROOS towards maturity, and document progress in the achievement of regional goals.

The Third GOOS Regional Forum, after having considered the Report of Sessional Working Group 0, on Potential Mechanisms for a Coordinated Development of the Global Coastal Network of the Coastal Module of GOOS, recommended that GOOS implement the following Pilot Projects:

1. Ocean Chlorophyll Global Integrated Network (ChloroGIN). This proposed project would be a global extension of the Latin-American Antares network to Africa, India and SE Asia; it is being developed by GOOS in conjunction with GEO, IOCCG and POGO. It includes satellite remote-sensing of ocean colour and sea-surface-temperature, and in situ observations of surface and subsurface chlorophyll and other variables, with a view to producing a large-scale time-series of ocean chlorophyll and productivity data as a basis for indicators of the state of each large marine ecosystem. The project would make available near-real-time maps of ocean colour

on the linked project websites. Subsurface chlorophyll should be measured in each region using undulators and other modern technology, to complement the satellite sea-surface observations.

2. Land-based Sources of Marine Pollution and Run-off. This proposed project would involve monitoring the amount of water and other material discharged or dumped into coastal seas and the content of the water, sediments, pollutants, sewage, waste, etc. This would require frequent measurements and should be implemented in several regions coordinated by the corresponding GRAs.

For the implementation, the GPO should link with the UNEP Global Programme of Action on Land-based Sources of Marine Pollution, as well as GEWEX and LOICZ.

The proposed J-PICO should make recommendations on how to extend operational projects in some regions to other GRAs, as a matter of priority.

3. Wind-wave–Current Interaction. This proposed project would involve operational forecasting for coastal areas. The activities envisaged under this project are already operational in some regions as a service to the offshore oil and gas industry whose Association (OGP) has requested its expansion into a GOOS pilot study in which the industry could participate. The Project should establish links with GODAE and JCOMM.

The Third Forum, after having considered the Report of Sessional Working Group 1, on GOOS Regional Alliance–LME Partnerships, drew the following Conclusions and made the following Recommendations for action.

1. Given the fact that the Benguela Current LME and GOOS-AFRICA have been collaborating to achieve their complementary objectives, and that this co-operation represents the most advanced partnership to date between an LME project and a GRA, the GOOS-AFRICA–BCLME partnership should conduct a "lessons learned" analysis of its experience in the light of the five LME modules mentioned here above and produce a report that could be used by LME–GRA partnerships in other regions.

2. Proof of concept studies are needed to facilitate downscaling 3-D dynamic models from the open ocean to the coastal ocean and for coastal ocean data-assimilation experiments. The results of such studies carried out in some countries should be made available, through GSSC and GODAE, to those GRAs still developing such activities. A meeting of those groups that are engaged in such downscaling studies should be called with a view to enhancing the relevant cooperation among GRAs.

3. Regional Ocean Observing Systems (ROOS) should be encouraged, by all GRAs/ROOS and LMEs that overlap geographically, to form partnerships with the appropriate Large Marine Ecosystem programmes, where their areas of concern overlap.

4. The recommendations of future GOOS Regional Forums should be so formulated as to ensure complementarity among LME programmes and GOOS Regional Alliances, since the LME programmes are getting funding for observing and assessment systems coupled to management which are of benefit to GOOS.

5. Collaboration between the Chairperson of I-GOOS and the Director of GEF: the Chairperson of I-GOOS should write a letter to the Director of GEF, indicating the invaluable role that the LME projects are already playing, and still need to play, in developing the end-to-end ecological observing, analysis and management systems that are needed to help meet the GOOS ecological objectives.

The Third Forum, after having considered the Report of Sessional Working Group 2, on the Role of GRAs in the Implementation the Coastal Zone Community of Practice and in the Development of Integrated Systems for Multi-hazard Disaster Warning, drew the following Conclusions and made the following Recommendations for action.

The role of GRAs in implementing GEO Coastal Zone Community of Practice

Given that the functions of GRAs and CPs are similar and that the CZCP is addressing high-level goals of GOOS, the Forum requested the Executive Secretary of the IOC to seek GEO endorsement of GRAs as GEO Communities of Practice for oceans and coasts, to convey the following message to the 3rd GEO Meeting, in November 2006.

"Given: (i) that the GEO has recognized GOOS as the oceans and coasts component of GEOSS; (ii) the importance of achieving the goals of GOOS to realize the benefits of GEOSS; (iii) that GRAs already perform functions expected of GEO Community of Practice; and (iv) that the GEOSS is to be built on relevant existing programmes; and (iv) that GOOS is sponsored by the IOC, WMO, UNEP and ICSU, the GEO is requested to recognize the importance of GOOS Regional Alliances to the realization of the societal benefits of the GEOSS through the activities of the Coastal Zone Community of Practice."

Role of GRAs in developing an integrated multi-hazard warning system for mitigating the impacts of tropical cyclones, extra-tropical storms and tsunamis

Since GRAs provide data and information that may be used by responsible operational bodies to issue warnings and forecasts, they clearly have a role in supporting multi-hazard warning systems in the following areas: (i) Coordination, integration and efficient use of available resources; (ii) Deployment, maintenance, calibration, development of standards, data management, reporting, communication networks, education, publication; (iii) Promotion of the transfer of research and development outputs, technology, and simulation applications among developed and developing or smaller GRAs; (iv) Coordination role in identifying who is involved in hazard detection and response, in making meteorological observations, and in effectively facilitating collaboration and exchange; (v) Education, which is essential to the reliability and success of the information reaching affected communities.

Whether GRAs should participate in the organisation of a CZCP Workshop on Coastal Urbanization, Development and Inundation, tentatively scheduled for September 2007

GRAs should consider getting involved in this activity by: (i) nominating each a representative to serve on the Workshop Organizing Committee, with a view to refining the goals and defining the deliverables of the Workshop, helping set the agenda and identifying who should be invited to participate in the Workshop; and/or (ii) becoming a sponsor of the Workshop; and/or (iii) serving as a host of the Workshop; and/or (iv) providing the venue for the Workshop; and (vi) if interested in participating in some way, contacting the CZCP through Tom Malone.

The Forum, after having considered the Report of Sessional Working Group 3, on Progress since the Second Forum and on the GRAs' Strengths, Constraints, Challenges, Priorities, Potential Solutions and Best Practice, drew the following Conclusions and made the following Recommendations for action.

The sustainability of GRAs and ROOS

There is a need for a strategy for the development of the Regional Ocean Observing Sytems (ROOS) through the GRAs. Each GRA should identify up to four key regional priorities, the products to be developed to address these priorities, and the expected societal benefits of these products, along the following lines: (i) Core parameters, equipment, data, and products; (ii) Partnership between data providers and information services; (iii) Communication of societal benefits using example products; (iv) Targeted capacity-building at several levels (data, products, information delivery, communication to end users).

Communication and education strategy

There is a need to communicate: (i) the societal benefits of the GRAs' activities at all levels; (ii) in simple terms, the necessity of ROOS for sustainable development (social, economic, environmental); (iii) how the ROOS provide essential information for informed decision-making.

There is a need to educate at several levels: (i) end users of products and services; (ii) policy-makers; (iii) the general public; (iv) schools (future leaders and scientists). There is also a need to look for educational initiatives that could leverage extra UNESCO support; and education using GOOS may increase national support for IOC. Possible avenues of search are: (i) partnership with professional communicators; (ii) media: press officers/communicators in Member State institutions; (iii) social marketers; (iv) teachers and educators; (v) WMO communication activities.

Communication among GRAs

The GRAs need to: (i) assume a commitment to attend and actively participate in the biennial GOOS Regional Forums; (ii) maintain a dialogue intersessionally through thematic working group(s) with a nominated moderator who has responsibility for facilitating a virtual (electronic) discussion and producing an outcome to be presented at the next regional forum, or through an electronic forum for practical exchange of best practice.

Partnerships and collaboration

There is a need for partnerships to sustain GRA activities to: (i) ensure programme delivery; (ii) avoid duplication of effort; (iii) share best practice; (iv) ensure dialogue with users of products and services; (v) leverage funding.

Regarding inter-GRA partnerships, there is a need for: (i) twinning or mentoring arrangements between GRAs; (ii) ministerial-level collaboration agreements between the Member States in different GRAs, with a view to facilitating formal inter-GRA collaboration (an example is the South Africa–Brazil–India Agreement, OCEANIBSA); (iii) informal networking among GRAs.

GRAs should also reach out to other relevant intergovernmental bodies for better coordination and cooperation, notably with WMO, UNEP and ISDR and, within IOC, with IODE/ODINs.

Capacity-building, resources

Consider the development of human resources under three headings: (i) Training at different levels (formal, professional); (ii) Retention of trained staff; (iii) Exchange.
Pursue the development and transfer of relevant technology.

Consider the improvement of data delivery and exchange under three headings: (i) Bandwidth issues; (ii) shared of solutions in some regions (e.g. BCLME/UCT) with other bodies; (iii) Working with IODE and the ODINs.

Increase the exploitation of available ships, ship time and platforms of opportunity, bearing in mind: (i) the fact that some regions have well developed ships-of-opportunity programmes; (ii) that experience and technology may be shared and be extended globally; (iii) the benefits from working with existing global initiatives; (iv) the availability of the WMO suite of Met-ocean data from ships of opportunity.

Funding

Funding may be increased through several environmental initiatives that may leverage support for GRA activities. It is therefore necessary to identify: (i) Global, regional and national initiatives that may provide support (donors, partner organisations); (ii) Key objectives of different funding initiatives and determine how GOOS objectives are aligned with these.

In addition to its recommendations based on the outcomes of the four sessional Working Groups, the Forum also recommended:

1. Completion by the GRAs of an inventory of other global, regional or national initiatives and programmes (e;g. LME, IWRM, HYCOS, UNEP Regional Seas Programme) that would allow GRAs to leverage resources and avoid duplication; this inventory should be available prior to the Eighth Session of I-GOOS.

2. The setting-up by GRAs, with the help of moderator(s) to be identified, of a regional discussion forum to maintain a dialogue intersessionally, starting with key points in the GOOS Implementation Plan and with ongoing reporting biennially.

3. Completion by GRA Chairpersons of an inventory of national, regional and international development partners, and determination of how GOOS priorities align with their development objectives; this inventory should be available prior to the Eighth Session of I-GOOS, and to be maintained up to date.

4. The development by GRAs, preferably through the identification of at least one key demonstration product, of products that increase GOOS's visibility, so as to enable GRAs to achieve sustained national and regional support (for example, the GRASP ocean analysis bulletin for the SE Pacific Region); these products should be available prior to the Fourth GOOS Regional Forum (2008).

5. The development of a sustained and funded GRA communication and education strategy that builds on existing IOC initiatives (for example, the IODE/Ocean Teacher, UNESCO/Bilko, Ocean Portal, and SEREAD); this strategy should be available prior to the Fourth GOOS Regional Forum (2008).

As far as possible, the execution of the foregoing additional recommendations should be by means of an Internet forum on the GOOS website.

6. THE FOURTH GOOS REGIONAL FORUM

The Chairman of GRASP offered to host the Fourth Forum in 2008 in Guayaquil, Ecuador. The Forum requested the GOOS Project Office to follow up this invitation with the Chairperson of GRASP, in consultation with the Executive Secretary of IOC and the I-GOOS Board, prior to the Eighth Session of I-GOOS, in 2007, and to inform the GRAs accordingly.

7. CLOSURE

In his closing remarks, the Chairman of I-GOOS acknowledged the success of the Forum and thanked both the International and the Local Organizing Committees, the GOOS-AFRICA Coordinating Committee and the African LMEs for their efforts in planning and organizing the Forum. He also thanked the Government of South Africa and the University of Cape Town and staff for the excellent facilities and assistance provided.

The Director of the Marine Research (MA-RE) Institute of the University of Cape Town, Professor John Field, formally closed the Forum at 13:30 on Friday 17 November 2006.

ANNEX I

AGENDA

1. OPENING

1.1 WELCOME AND INTRODUCTIONS

1.2 ADMINISTRATIVE ARRANGEMENTS AND DOCUMENTATION

2. REVIEW OF OBJECTIVES AND EXPECTED OUTPUTS OF THE FORUM

2.1 RESULTS FROM THE FIRST AND THE SECOND REGIONAL FORUM AND SUMMARY OF PROGRESS SINCE THE SECOND FORUM

2.2 OVERVIEW OF THE IMPLEMENTATION STRATEGY FOR THE COASTAL MODULE OF GOOS

2.3 THE LME CONCEPT, ITS DEVELOPMENT AND CONTRIBUTION TO GOOS

2.4 PROGRESS REPORT OF THE JCOMM-GSSC-GRA TASK TEAM ON THE IMPLEMENTATION STRATEGY FOR THE COASTAL MODULE OF GOOS

2.5 DEVELOPING SYNERGY BETWEEN LMEs AND GRAs

3. REPORTS BY GOOS REGIONAL ALLIANCES AND GOOS NATIONAL COMMITTEES

4. REPORTS OF THE SESSIONAL WORKING GROUPS

4.1 WORKING GROUP 0

4.2 WORKING GROUP 1

4.3 WORKING GROUP 2

4.4 WORKING GROUP 3

5. RECOMMENDATIONS/ACTIONS

6. THE FOURTH GOOS REGIONAL FORUM

7. CLOSURE

ANNEX II

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ANNEX III

LIST OF PRESENTATIONS AND DOCUMENTS AVAILABLE ON THE WEB SITE FOR THE THIRD GOOS REGIONAL FORUM

Presentations

No.	Presenter	Subject
GRF3-pres-1	François Gérard	Results from the First and Second Regional Forum and summary of progress since the Second Forum.
GRF3-pres-2	François Gérard	Next step for the GOOS Regional Alliances, François Gérard on behalf of Silvana Vallerga.
GRF3-pres-3	François Gérard	GRAND GOOS Regional Alliances Network Development, François Gérard on behalf of Silvana Vallerga.
GRF3-pres-4	Tom Malone	Overview of the Implementation Strategy for the CoastalModule of GOOS including information on the proposal for a Joint GOOS/GTOS Panel for Integrated Coastal Observations (J-PICO) and the Coastal Zone Community of Practice.
GRF3-pres-5	Hans Dahlin	Progress report of the JCOMM-GSSC-GRAs Task Team on the Implementation Strategy for the Coastal Module of the Global Ocean Observing System.
GRF3-pres-6a	Kenneth Sherman & Ned Cyr	LMEs, GEOSS and GOOS: Integrated Monitoring and Assessments
GRF3-pres-6b	Ned Cyr	The LME Concept and its contributions to GOOS
GRF3-pres-7	Geoff Brundrit	Developing Synergy between GOOS Africa and the African LMEs.
GRF3-pres-8	Michael J. O'Toole	Climate Change in the Benguela Current LME and the Benguela Current Commission.
GRF3-pres-9	Mary Altalo	Introduction to the objectives and expected outputs of Sessional Working Group 0.
GRF3-pres-10	John Field & Kenneth Sherman	Introduction to the objectives and expected outputs of Sessional Working Group 1.
GRF3-pres-11	Edgar Cabrera	World Meteorological Organisation: Role of WMO and national meteorological and hydrological services in developing more disaster-resilient communities.
GRF3-pres-12	Tom Malone	Introduction to the objectives and expected outputs of Sessional Working Group 2.
GRF3-pres-13		Introduction to the objectives and expected outputs of Sessional Working Group 3.
GRF3-pres-14	Mary Altalo	Conclusions from Working Group 0.
GRF3-pres-15	John Field	Conclusions from Working Group 1.
GRF3-pres-16	Tom Malone	Conclusions from Working Group 2.
GRF3-pres-17	Valborg Byfield	Conclusions from Working Group 3.

Presentations and Reports on GOOS Regional Alliances and National GOOS Activities

GRF3-gra-pres-1	Janice Trotte	OCEATLAN – Regional Alliance in Oceanography for the Upper Southwest and Tropical Atlantic (slides).
GRF3-gra-pres-2	Takashi Yoshida	NEAR-GOOS (slides).
GRF3-gra-pres-3	Justin Ahanhanzo	GOOS-AFRICA (slides).
GRF3-gra-pres-4	Somkiat Khokiattiwong	SEAGOOS (slides).
GRF3-gra-pres-5	Shailesh Nayak	Indian Ocean GOOS (slides).
GRF3-gra-pres-6	Mary Altalo	US GOOS -The Integrated Ocean Observing System (IOOS) (slides).
GRF3-gra-pres-7	Guillermo García Montero	IOCARIBE-GOOS (slides).
GRF3-gra-pres-8	Mario R. Proaño Silva	GRASP (slides).
GRF3-gra-pres-9	Hans Dahlin	EuroGOOS (slides).
GRF3-gra-pres-10	Mary Power	The Pacific Island Global Ocean Observing System for Sustainable Development in the Pacific (PIGOOS) (slides).
GRF3-gra-pres-11	Sukru Besikpte	Black Sea GOOS (slides).
GRF3-gra-pres-12	Hans Dahlin	Mediterranean Operational Oceanography Network (slides).
GRF3-gra-pres-13	Hans Dahlin	Summary of the Arctic GOOS planning (slides).
GRF3-gra-pres-14	Savi Naraynan	International Arctic Observing System iAOOS (slides).
GRF3-gra-pres-15	Trevor Guymer	UK National GOOS Committee (slides).
GRF3-gra-pres-16	Adi Kellerman	The ICES Network (slides).
GRF3-gra-pres-17	Worth Nowlin et al.	Gulf of Mexico Coastal Ocean Observing System - Visit to Mexico in June of 2006 (Report).
GRF3-gra-pres-18	Ray Stedman	Western Australia GOOS (Report).
GRF3-gra-pres-19	Peter Dexter	SOOS – A Workshop on a Southern Ocean Observing System (Report)

Sessional Working Group Reports

GRF3-WG-report-1	Report from Working Group 0.
GRF3-WG-report-2	Report from Working Group 1.
GRF3-WG-report-3	Report from Working Group 2.
GRF3-WG-report-4	Report from Working Group 3.

Information Documents

GRF-III-1		Timetable for 3rd GOOS Regional Forum.
GRF-III-2		3rd GOOS Regional Forum Prospectus (report)
GRF-III-3		GOOS Regional Policy
GRF-III-4		The Global Ocean Observing System for Africa (GOOS-Africa): Monitoring and Predicting in Large Marine Ecosystems
GRF-III-5		NEAR-GOOS 2006 Report
GRF-III-6		Southeast Asian GOOS Report
GRF-III-7		Joint JCOMM-GSSC-GRA Report 30 Aug 06 (Draft)
GRF-III-8		OCEATLAN GRA Report
GOOS-125		The Integrated Strategic Design Plan for the Coastal Ocean Observations Module of GOOS (GOOS Report No 125)
GOOS-127		Report of the first Regional Forum of the Global Ocean Observing System (GOOS Report No 127)
GOOS-130		Report of the sixth session of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System (I-GOOS) (GOOS Report No 130)
GOOS-139		Report of the second Regional Forum of the Global Ocean Observing System (GOOS Report No 139)
GOOS-148		An Implementation Strategy for the Coastal Module of GOOS (GOOS Report No 148)

ANNEX IV

LIST OF ACRONYMS

ACP	African, Caribbean and Pacific
BCLME	Benguela Current Large Marine Ecosystem
CODAE	Coastal Ocean Data Assimilation Experiment
COOP	Coastal Ocean Observations Panel
CP	Community of Practice
CZCP	Coastal Zone Community of Practice
EEZ	Exclusive Economic Zone
EuroGOOS	European Global Ocean Observing System
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
GCLME	Guinea Current Large Marine Ecosystem
GCN	Global Coastal Network
GCOS	Global Climate Observing System (WMO, IOC, UNEP, ICSU)
GEF	Global Environment Fund (WB-UNEP-UNDP)
GEO	Global Earth Observations
GEOSS	Global Earth Observation System of Systems
GEWEX	Global Energy and Water Cycle Experiment (WMO-ICSU-IOC)
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GOOS-AFRICA	Global Ocean Observing System for Africa
GPO	GOOS Project Office
GRA	GOOS Regional Alliance
GRAND	GOOS Regional Alliance Network Development (EU)
GRASP	GOOS
GRC	GOOS Regional Council (proposed)
GSSC	GOOS Scientific Steering Committee
GTOS	Global Terrestrial Observing System (FAO, WMO, UNESCO, ICSU)
HYCOS	Hydrological Cycle Observing System (WMO)
ICES	International Council for the Exploration of the Sea
ICG	International Co-ordination Group
ICSU	International Council for Science
I-GOOS	Intergovernmental Committee for the Global Ocean Observing System (IOC-WMO)
IGOS	Integrated Global Observing Strategy
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
IOCARIBE-GOOS	Global Ocean Observing System for IOCARIBE
IOCCG	International Ocean Colour Co-ordinating Group
IODE	International Oceanographic Data and Information Exchange
IOGOOS	Indian Ocean Global Ocean Observing System
IOTWS	Indian Ocean Tsunami Warning and Mitigation System
ISDR	International Strategy for Disaster Reduction (UN)
IWRM	Integrated Water Resources Management
JCOMM	Joint Commission on Oceanography and Marine Meteorology (WMO-IOC)
JPICO	Joint Panel for Integrated Coastal Observations
LME	Large Marine Ecosystem
LOICZ	Land-Ocean Interaction in the Coastal Zone (ICSU)
MedGOOS	Mediterranean Global Ocean Observing System
NEPAD	New Partnership for Africa's Development
OCEANIBSA	Inter-regional Alliance for Oceanography and Antarctic Research initiative jointly developed by Brazil, India and South Africa
OCEATLAN	Regional Alliance in Oceanography for the Upper Southwest and Tropical Atlantic

ODIN	Oceanographic Data and Information Network
ODINAfrica	Oceanographic Data and Information Network for Africa
ODINCARSA	Oceanographic Data and Information Network for the IOCARIBE and South America
OGP	International Association of Oil and Gas Producers
OOPC	Ocean Observations Panel for Climate
PICES	North Pacific Marine Sciences Organization
PI-GOOS	Pacific Islands Global Ocean Observing System
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
POGO	Partnership for Observation of the Global Ocean
PTWS	Pacific Tsunami Warning System
ROOFS	Regional Ocean Observing and Forecasting System
ROOS	Regional Ocean Observing System
RSP	Regional Seas Programme (UNEP)
SEAGOOS	South East Asia Global Ocean Observing System
SEREAD	Scientific Educational Resources and Experience Associated with the Deployment of Argo profiling floats in the South Pacific Ocean
SGGOOS	Steering Group for GOOS (IOC-ICES)
TDA/SAP	Transboundary Diagnostic Analysis and Strategic Action Programmes
UCT	University of Cape Town
UIC	User Interface Committee
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US-GOOS	United States Global Ocean Observing System
WAGOOS	West Australian Global Ocean Observing System
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans S. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' ***(Also printed in Spanish)***
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping ***(Also printed in French and Spanish)***
12. Joint 100-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica ***(Spanish only)***
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources ***(Also printed in French and Spanish)***
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans ***(Also printed in French)***
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities ***(Also printed in Spanish)***
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CCPS Working Group on the Investigations of 'El Niño' (***Also printed in Spanish)***
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. Cancelled
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic ***(Also printed in French)***
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico ***(Also printed in Spanish)***
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping

59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications
60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans ***(Also printed in French)***
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' ***(Spanish only)***
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico ***(Also printed in Spanish)***
74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
81. Fifth Joint IOG-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs
83. Seventh Session of the JSC Ocean Observing System Development Panel
84. Fourth Session of the IODE Group of Experts on Marine Information Management
85. Sixth Session of the IOC Editorial Board for the International Bathymetric chart of the Mediterranean and its Geological/Geophysical Series
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide
87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific
88. Eighth Session of the JSC Ocean Observing System Development Panel
89. Ninth Session of the JSC Ocean Observing System Development Panel
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region
92. Fifth Session of the Joint IOC-JGOFS CO, Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System
97. Joint Meeting of GEMSI and GEEP Core Groups
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
102. Second Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans
104. Fifth Session of the IOC Consultative Group on Ocean Mapping
105. Fifth Session of the IODE Group of Experts on Marine Information Management
106. IOC-NOAA *Ad hoc* Consultation on Marine Biodiversity
107. Sixth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
108. Third Session of the Health of the Oceans (HOTO) Panel of the Joint Scientific and Technical Committee for GLOSS
109. Second Session of the Strategy Subcommittee (SSC) of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System
110. Third Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
111. First Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate
112. Sixth Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting
113. First Meeting of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS)
114. Eighth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño" ***(Spanish only)***
115. Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Central Eastern Atlantic ***(Also printed in French)***
116. Tenth Session of the Officers Committee for the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO), USA, 1996
117. IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Fifth Session, USA, 1997
118. Joint Scientific Technical Committee for Global Ocean Observing System (J-GOOS), Fourth Session, USA, 1997
199 First Session of the Joint 100-WMO IGOSS Ship-of-Opportunity Programme Implementation Panel, South Africa, 1997
120. Report of Ocean Climate Time-Series Workshop, Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, USA, 1997

121. IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS), Second Session, Thailand, 1997

122. First Session of the IOC-IUCN-NOAA *Ad hoc* Consultative Meeting on Large Marine Ecosystems (LME), France, 1997

123. Second Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), South Africa, 1997

124. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Colombia, 1996 ***(also printed in Spanish)***

125. Seventh Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ireland, 1997

126. IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), First Session, France, 1997

127. Second Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 1998

128. Sixth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1997

129. Sixth Session of the Tropical Atmosphere - Ocean Array (TAO) Implementation Panel, United Kingdom, 1997

130. First Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 1998

131. Fourth Session of the Health of the Oceans (HOTO) Panel of the Global Ocean Observing System (GOOS), Singapore, 1997

132. Sixteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), United Kingdom, 1997

133. First Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1998

134. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IOC/EB-IBCWIO-IW3), South Africa, 1997

135. Third Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), France, 1998

136. Seventh Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting, Germany, 1997

137. Implementation of Global Ocean Observations for GOOS/GCOS, First Session, Australia, 1998

138. Implementation of Global Ocean Observations for GOOS/GCOS, Second Session, France, 1998

139. Second Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Brazil, 1998

140. Third Session of IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), China, 1998

141. Ninth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Ecuador, 1998 ***(Spanish only)***

142. Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Croatia, 1998

143. Seventh Session of the Tropical Atmosphere-Ocean Array (TAO) Implementation Panel, Abidjan, Côte d'Ivoire, 1998

144. Sixth Session of the IODE Group of Experts on Marine Information Management (GEMIM), USA, 1999

145. Second Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), China, 1999

146. Third Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Ghana, 1999

147. Fourth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC); Fourth Session of the WCRP CLIVAR Upper Ocean Panel (UOP); Special Joint Session of OOPC and UOP, USA, 1999

148. Second Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1999

149. Eighth Session of the Joint IOC-JGOFS CO2 Advisory Panel Meeting, Japan, 1999

150. Fourth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Japan, 1999

151. Seventh Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1999

152. Sixth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 1999

153. Seventeenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), Canada, 1999

154. Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y el Golfo de Mexico (IBCCA), Septima Reunión, Mexico, 1998

IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), Seventh Session, Mexico, 1998

155. Initial Global Ocean Observing System (GOOS) Commitments Meeting, IOC-WMO-UNEP-ICSU/Impl-III/3, France, 1999

156. First Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Venezuela, 1999 ***(also printed in Spanish and French)***

157. Fourth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), China, 1999

158. Eighth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Russian Federation, 1999

159. Third Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), Chile, 1999

160. Fourth Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS). Hawaii, 2000

161. Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, USA, 2000

162. Third Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 2000

163. Fifth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Poland, 2000

164. Third Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 2000

165. Second Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Cuba, 2000 ***(also printed in Spanish and French)***

166. First Session of the Coastal Ocean Observations Panel, Costa Rica, 2000

167. First GOOS Users' Forum, 2000

168. Seventh Session of the Group of Experts on the Global Sea Level Observing System, Honolulu, 2001

169. First Session of the Advisory Body of Experts on the Law of the Sea (ABE-LOS), France, 2001 ***(also printed in French)***

170. Fourth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, Chile, 2001

171. First Session of the IOC-SCOR Ocean CO_2 Advisory Panel, France, 2000

172. Fifth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Norway, 2000 ***(electronic copy only)***

173. Third Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, USA, 2001 ***(also printed in Spanish and French)***

174. Second Session of the Coastal Ocean Observations Panel and GOOS Users' Forum, Italy, 2001

175. Second Session of the Black Sea GOOS Workshop, Georgia, 2001

176. Fifth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Republic of Korea, 2000

177. Second Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Morocco, 2002 ***(also printed in French)***

178. Sixth Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Australia, 2001 ***(electronic copy only)***

179. *Cancelled*

180. Second Session of the IOC-SCOR Ocean CO_2 Advisory Panel, Honolulu, Hawaii, U.S.A, 2002 ***(electronic copy only)***

181. IOC Workshop on the Establishment of SEAGOOS in the Wider Southeast Asian Region, Seoul, Republic of Korea, 2001 (SEAGOOS preparatory workshop) ***(electronic copy only)***

182. First Session of the IODE Steering Group for the Resource Kit, USA, 19–21 March 2001

183. Fourth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), France, 2002

184. Seventh Session of the IODE Group of Experts on Marine Information Management (GEMIM), France, 2002 ***(electronic copy only)***

185. Sixth Session of IOC/WESTPAC Coordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), Republic of Korea, 2001 ***(electronic copy only)***

186. First Session of the Global Ocean Observing System (GOOS) Capacity Building Panel, Switzerland, 2002 ***(electronic copy only)***

187. Fourth Session of the ad hoc Advisory Group for IOCARIBE-GOOS, 2002, Mexico ***(also printed in French and Spanish)***

188. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IBCWIO), Mauritius, 2000

189. Third session of the Editorial Board for the International Bathymetric Chart of the Western Pacific, Chine, 2000

190. Third Session of the Coastal Ocean Observations Panel and GOOS Users' Forum, Vietnam, 2002

191. Eighth Session of the IOC Consultative Group on Ocean Mapping, Russian Federation, 2001

192. Third Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Lisbon, 2003 ***(also printed in French)***

193. Extraordinary Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Chile, 1999 ***(Spanish only; electronic copy only)***

194. Fifth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, France, 2002

195. Sixth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, South Africa, 2003

196. Fourth Session of the Coastal Ocean Observations Panel, South Africa, 2002 ***(electronic copy only)***

197. First Session of the JCOMM/IODE Expert Team On Data Management Practices, Belgium, 2003 *(also JCOMM Meeting Report No. 25)*

198. Fifth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2003

199. Ninth Session of the IOC Consultative Group on Ocean Mapping, Monaco, 2003 ***(Recommendations in English, French, Russian and Spanish included)***

200. Eighth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 2003 ***(electronic copy only)***

201. Fourth Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Greece, 2004 ***(also printed in French)***

202. Sixth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2004 ***(electronic copy only)***

203. Fifth Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Argentina, 2005 ***(also printed in French)***

204. Ninth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 2005 ***(electronic copy only)***

205. Eighth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), China, 2003 ***(electronic copy only)***

206. Sixth Meeting of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Spain, 2006 ***(also printed in French)***

207. Third Session of the Regional Forum of the Global Ocean Observing System, South Africa, 2006 ***(electronic copy only)***